SASH-OPERATING DEVICES

Metallic Sash-Operator Co.

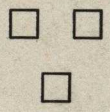
St. Louis

Approx 10% Discount

Geared Sash-Operating Devices

for both

Wood And Metal Sash



Manufactured by

Metallic Sash-Operator Company

Twenty-Third and Chestnut Streets

St. Louis, Mo.

May 1, 1918

TERMS

Our terms are thirty days net, or two per cent discount for cash, if paid within ten days from date of invoice.

PRICES

The prices listed in this catalogue supersede those of previous issue, and are subject to change without notice.

All prices quoted are F. O. B. St. Louis, Mo.

Discounts from price list will be quoted to the trade on application.

On all orders amounting to less than one hundred dollars, net, a "Job Charge" of five dollars will be made to cover the expense of detailing etc.

Prices do not include erection unless specifically stated in our quotation.

REMITTANCES

All remittances must be made by draft on St. Louis or New York.

DELIVERY

Unless definitely instructed to the contrary, we will ship by freight.

CLAIMS

All claims for shortages or errors, must be made within ten days after receipt of shipment.

RETURNING GOODS

Permission must be secured from us BEFORE RETURNING GOODS.

In allowing credit for goods returned, 20% will be deducted.

THE Metallic Sash-Operator Company is in the nature of an engineering organization with ample manufacturing facilities for executing the designs produced by its staff. Adequate experience in the production of sash operating devices for both wood and metal sash of every description, places the Company in a position to render valuable service.

Having been called upon to develop equipment for practically every sort of sash, our designs, which long experience and practical operation have proven to be best adapted to the work required of them, cover a wide range of applications all over the United States.

The Company possesses a manufacturing plant sufficient to guarantee prompt and dependable service, and to insure a quality of workmanship and materials which will be in every way satisfactory.

Some idea of the scope of operation of the Metallic Sash-Operator Company may be gained from the following partial list of customers, for whom installations have been designed and manufactured.

Spreckles Sugar Co.	Manteca, California
Reo Motor Car Co.	Lansing, Michigan
United States Penitentiary	Atlanta, Georgia
Goodyear Tire & Rubber Co.	Akron, Ohio
Pittsburgh Steel Products Co.	Allenport, Pennsylvania
Mare Island Navy Yard	Mare Island, California
James O. Heyworth	Sault Ste. Marie, Ontario, Canada
Port Arthur High School	Port Arthur, Texas
Grand Trunk Railway Car Shops	Port Huron, Michigan
Swift & Company	Rio Janeiro, Brazil
Standard Forgings Company	Indiana Harbor, Indiana
Rust Engineering Company	Birmingham, Alabama
Henry Green	Orlando, Florida
Peerless Motor Car Company	Cleveland, Ohio
Kerr Turbine Co.	Wellsville, New York
Harsh-Edmonds Shoe Company	Milwaukee, Wisconsin
Union Pacific Railroad Company	Gilmore, Nebraska
Bethlehem Steel Company	Sparrows Point, Maryland
International Harvester Company	Chicago, Illinois
Redfield High School	Redfield, South Dakota
Pioneer Telephone and Telegraph Company,	Shawnee, Oklahoma
Central High School	Washington, D.C.

The Texas Company	Port Arthur, Texas
Union-Buffalo Mills Co.	Union, South Carolina
Fairbanks-Morse Company	Beloit, Wisconsin
Union Drawn Steel Company	Gary, Indiana
Nordyke-Marmon Company	Indianapolis, Indiana
National Malleable Casting Co.	Chicago, Illinois
Aluminum Ore Company of America	East St. Louis, Illinois
American Steel & Wire Company	Donora, Pa.
Atlas Crucible Steel Co.	Dunkirk, N. Y.
Tallahassee Power Company	Baden, N. C.
Timken Roller Bearing Company	Canton, Ohio
American Shipbuilding Co.	Lorain, Ohio
West Virginia Woodwaste Chemical Co.	Gauley Mills, W. Va.
American Locomotive Works	Allegheny, Pa.
Carnegie Steel Co.	Duquesne Works, Duquesne, Pa.
General Roofing Company	San Pablo, California
El Paso Gas Plant	El Paso, Texas
Louisville Gas & Electric Co.	Louisville, Ky.
Marshall Field & Co.	Chicago, Illinois
Canedy-Otto Mfg. Co.	Chicago Heights, Illinois
Indiana Coke & Gas Company	Terre Haute, Ind.
Quaker Oats Co.	Cedar Rapids, Iowa
Inland Steel Company	Indiana Harbor, Ind.
Phillips Exeter Academy	Exeter, N. H.
Elkhorn Piney Coal Mining Company	Virgie, Kentucky
Union Pacific Railroad Company	Marysville, Kans.
U. S. Bureau of Engraving & Printing	Washington, D. C.
Libby, McNeil & Libby	Waupun, Wisc.
Hotel Elton	Waterbury, Connecticut
Central High School	Minneapolis, Minn.
Busch-Sulzer Bros. Diesel Engine Company	St. Louis, Mo.
Woonsocket Rubber Company	Woonsocket, Rhode Island

The following pages will serve to indicate the extent of the lines manufactured by this Company, and the variety of equipments which we are prepared to furnish upon very short notice. Especial attention is directed to the substantial character of the designs, ample metal being provided to meet all strains put upon them in normal service.

An unusually high safety factor is embodied in all of our designs,and

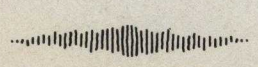
ratings of capacity are in every instance extremely conservative. Where we reccommend a given run of sash, it may be taken for granted that in actual practice a considerable longer run could be handled by the equipment, although we do not advise loading up the units to their full actual capacity.

Ease of operation is a prime factor in equipment of this character, and in this respect it will be found that our designs are mechanically correct and satisfactory from every standpoint. It is possible to skimp sizes, and otherwise reduce the working qualities of sash-operators, but we do not approve of such practice, and as a result the life of our installations is long.

The cost of Metallic Sash-Operators may at first seem high, but when the ample design is taken into consideration, and the assurance of long life and easy working are added, it will be seen that as in other lines, the best in the end is by far the most economical.

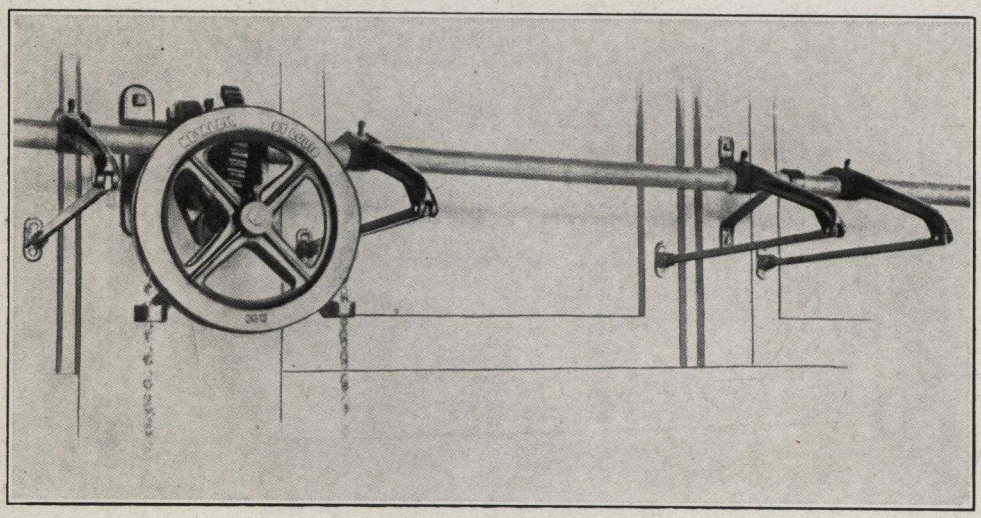
As nearly every installation embodies special features which require a considerable amount of engineering work, we maintain a complete force of competent men, and gladly co-operate whenever our services are requested. Thus many prominent Architests and Engineers call upon us to develop proper and complete designs for sash-operators to satisfy the requirements of their various plans. Experience and practical application of theory enable us to give a service in this direction, which has been highly commended and is being utilized more and more fully as time passes.

Whether preliminary estimates and sketches, or the final quotations and designs for erection are desired, we invite requests for service, and will give them prompt, careful attention.



Metallic Sash-Operators are built for the satisfaction of tomorrow, not for the price of today.

STYLE No. 1



This is a very practical and simple operator for controlling side-pivoted and top or bottom hinged sash. It will control 100 feet or less of pivoted sash, and hinged sash according to their weight and position. A continuous chain transmits the power from the hand to the gear.

The gears are made in four sizes and the connecting arms in three. The wrought shaft brackets can be furnished in almost any length.

PRICES

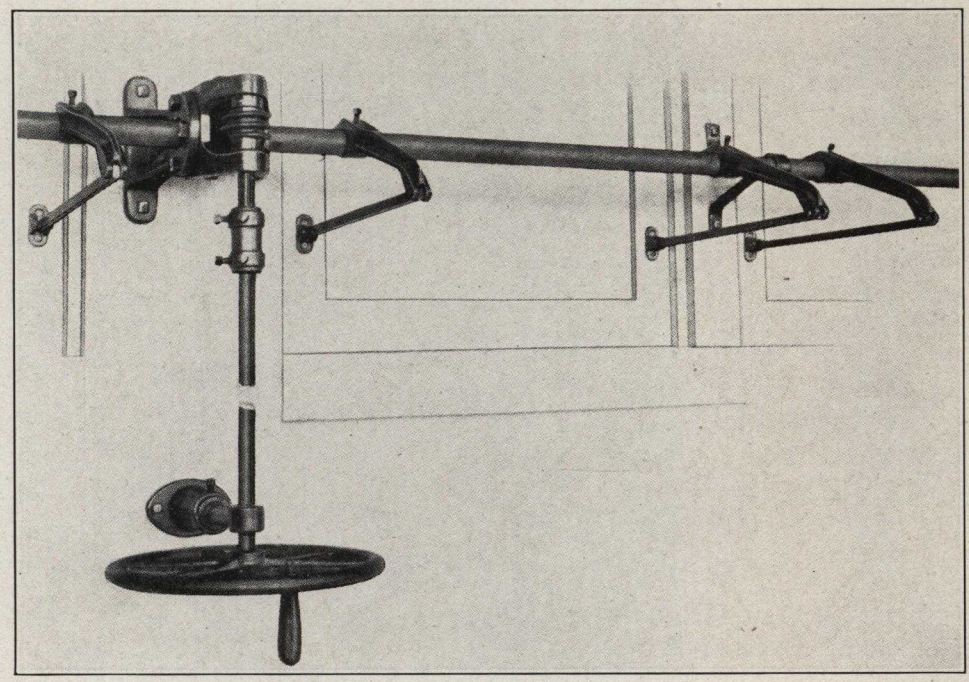
Prices quoted on all Operating Gears include 30' of bright chain. If galvanized chain is wanted, add 60c to the list price of the gears. Prices quoted on Connecting Arms, include Connecting Rod and Sash Plate. Price quoted on Shafting includes necessary Couplings.

	LIST EACH
Operating Gear No. 191	$8.00
Operating Gear No. 361	8.50
Operating Gear No. 521	10.00
Operating Gear No. 1501	14.00
Operating Gear No. 361 Enclosed	10.00
Connecting Arm No. 60 (6")	.75
Connecting Arm No. 90 (9")	.75
Connecting Arm No. 120 (12")	.83
Extra Heavy Arm Clip	.15

	LIST EACH
Wrought Shaft Brackets, 9" or less o.c.	.40
Wrought Shaft Brackets, 9" to 12" o.c.	.50
Each additional 3" o.c.	.10
1 5-16" Horizontal Shafting, per foot	.22
Extra Chain, per foot (Bright)	.05
Extra Chain, per foot (Galvanized)	.07
No. 197 Idler	.80
1 5-16" Shaft Couplings	1.00
3/4" Rod Coupling	.35

All necessary bolts and screws are furnished

STYLE No. 2



This operator is the same as No. 1 with one exception. A hand wheel and ¾ inch rod are used to transmit the power from the hand to the gear. The ¾ inch rod is placed from 9 to 12 inches from the wall, according to length of the gear bracket.

PRICES

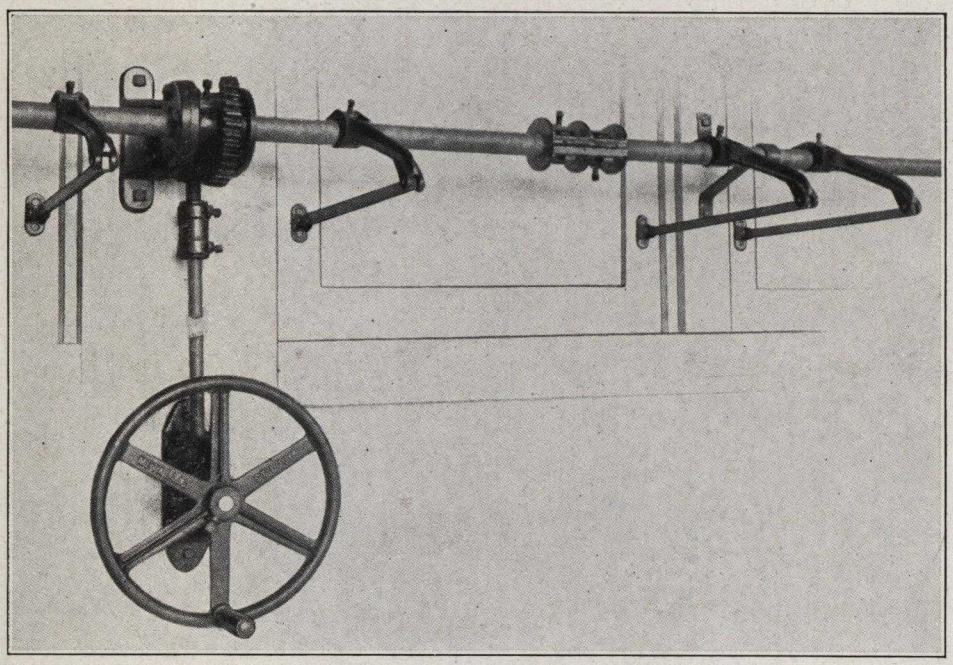
Prices quoted on all Operating Gears include Hand Wheel and Bracket. Prices quoted on Connecting Arms include Connecting Rod and Sash Plate. Price quoted on Shafting includes necessary Couplings. Price quoted on ¾" Vertical Rod includes necessary Couplings and Brackets 6'-0" on center.

	LIST EACH
Operating Gear No. 192	$7.50
Operating Gear No. 362	8.00
Operating Gear No. 522	9.50
Operating Gear No. 1502	13.50
Operating Gear No. 362 Enclosed	9.50
Connecting Arm No. 60 (6")	.75
Connecting Arm No. 90 (9")	.75
Connecting Arm No. 120 (1 ")	.83

	LIST EACH
Wrought Shaft Brackets, 9" or less o.c.	.40
Wrought Shaft Brackets, 9" to 12 " o.c.	.50
Each additional 3" o.c.	.10
1 5-16" Horizontal Shafting, per foot	.22
Vertical ¾" Rod, per foot	.28
Extra Brackets for ¾" Rod	.90
¾" Universal Joint	1.20
1 5-16" Universal Joint	1.80

All necessary bolts and screws are furnished

STYLE No. 3



This operator is the same as No 1 with one exception. A Hand Wheel, Bevel Gear and 3/4 inch Rod are used to transmit the power from the hand to the gear. The 3/4 inch rod is situated 2 inches from the wall.

PRICES

Prices quoted on all Operating Gears include Bevel Gear and Hand Wheel. Prices quoted on Connecting Arms include Connecting Rod and Sash Plate. Price quoted on Shafting includes necessary Couplings. Price quoted on 3/4" Vertical Rod includes necessary Couplings and Brackets 6'-0" on center.

	LIST EACH
Operating Gear No. 193	$9.50
Operating Gear No. 363	10.00
Operating Gear No. 523	12.00
Operating Gear No. 1503	16.00
Operating Gear No. 363 Enclosed	12.00
Connecting Arm No. 60 (6")	.75
Connecting Arm No. 90 (9")	.75
Connecting Arm No. 120 (12")	.83

	LIST EACH
Wrought Shaft Brackets, 9" or less o.c.	.40
Wrought Shaft Brackets, 9" to 12 ' o.c.	.50
Each additional 3" o.c.	.10
1 5-16" Horizontal Shafting, per foot	.22
Vertical 3/4" Rod, per foot	.20
Extra Brackets for 3/4" Rod	.40
3/4" Universal Joint	1.20
1 5-16" Universal Joint	1.80

All necessary bolts and screws are furnished

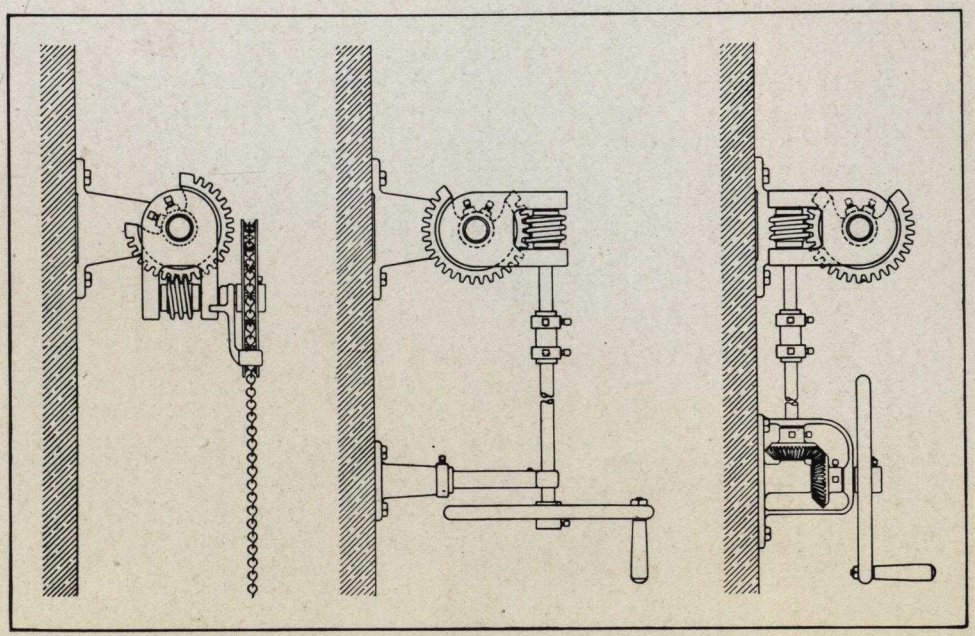
General Information Relative To Torsion Sash-Operators

All Styles of Torsion Sash-Operators are made in four sizes, with the exception of Styles Nos. 4 and 5. Style No. 6 can be furnished in a small size also, using ¾" shafting. The Gear Ratios of the various sizes are 19 to 1, 36 to 1, 52 to 1 and 150 to 1.

In numbering the Operating Gears we have used the following method to indicate the Style and Gear Ratio. The last digit in the gear number indicates the Style, and the previous digits the Gear Ratio. Hence, Operating Gear No. 363 is a Style No. 3 Operating Gear, having a Gear Ratio of 36 to 1, and Operating Gear No. 1502 is a Style No. 2 Operating Gear, having a gear ratio of 150 to 1. By "Gear Ratio" is meant the number of revolutions of the chain wheel or hand wheel necessary to turn the shaft through one complete revolution. It will be remembered, however, that it is ordinarily necessary to revolve the shaft through one-half of one revolution, or 180 degrees, to complete the operation of a run of sash.

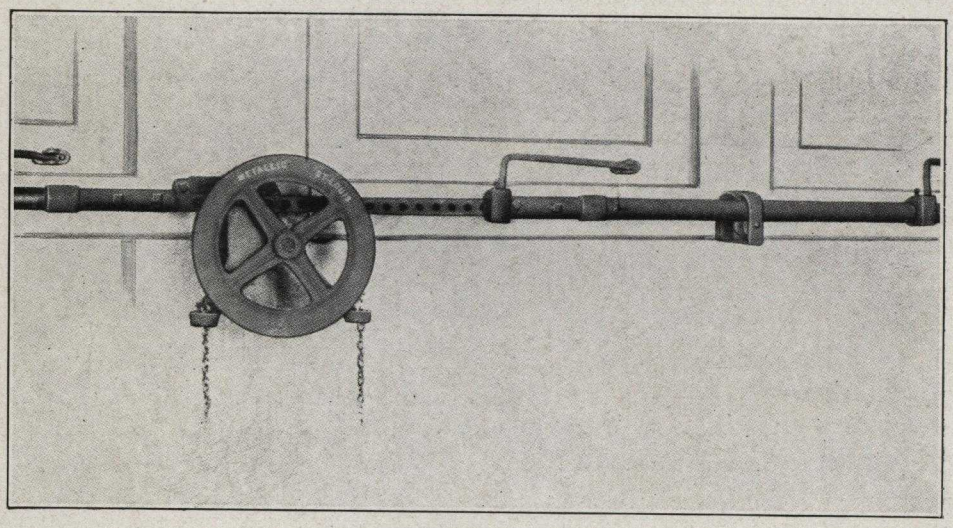
Style No. 1 is operated by a continouus chain passing over a notched sheave wheel. Style No. 2 is operated by a vertical rod, and a hand wheel in a horizontal position. Style No. 3 is operated by a vertical rod and bevel gear, and a hand wheel in a vertical position.

The formation of these three Styles is shown below. Style No. 6 is similar to Style No. 2, and is formed by placing the No. 6 Eye at the point where the coupling is show on the drawing below.



Style No. 1 Style No. 2 Style No. 3

STYLE No. 4



This operator is used to control top and bottom pivoted or side hinged sash opening in, and will successfully operate a run of 75 feet of either. The shaft is supported by roller brackets. The power is transmitted to the gear by means of an endless chain.

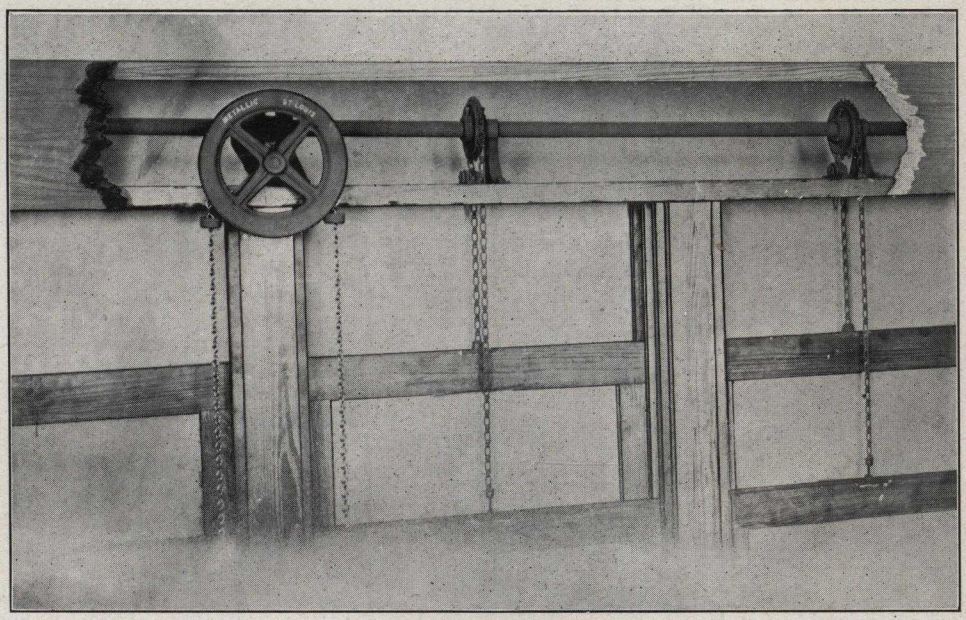
The No. 4 Sash Connections can be used with the No. 9-A and No. 9-B Operating Gears shown on page 24. These Operating Gears are much more powerful than the No. 194 Operating Gear and are capable of operating much longer runs.

PRICES

	LIST EACH
Operating Gear No. 194 Including 30 feet of bright chain	$12.00
Operating Gear No. 194 Including 30 feet of galvanized chain	12.60
Sash Connection No. 4 Including sash plate and shaft connection	.60
Roller Brackets No. 4	.80
1 5-16 Horizontal Shafting, per foot Including necessary couplings	.22
Extra chain, per foot, bright	.05
Extra chain, per foot, galvanized	.07

All necessary bolts and screws are furnished

STYLE No. 5



Style No. 5 is an operator made to control counterbalanced sash. The shaft may be enclosed as shown in the cut or suspended in front of the sash.

The amount of sash that can be handled by one gear is determined by conditions.

No weights or other hardware are needed as the sash counterbalance themselves through the operator. Where it is necessary chains and fittings can be had to complete the circuit so that the sash are pulled in both directions. Four sash rollers are furnished for each sash to eliminate friction at sides.

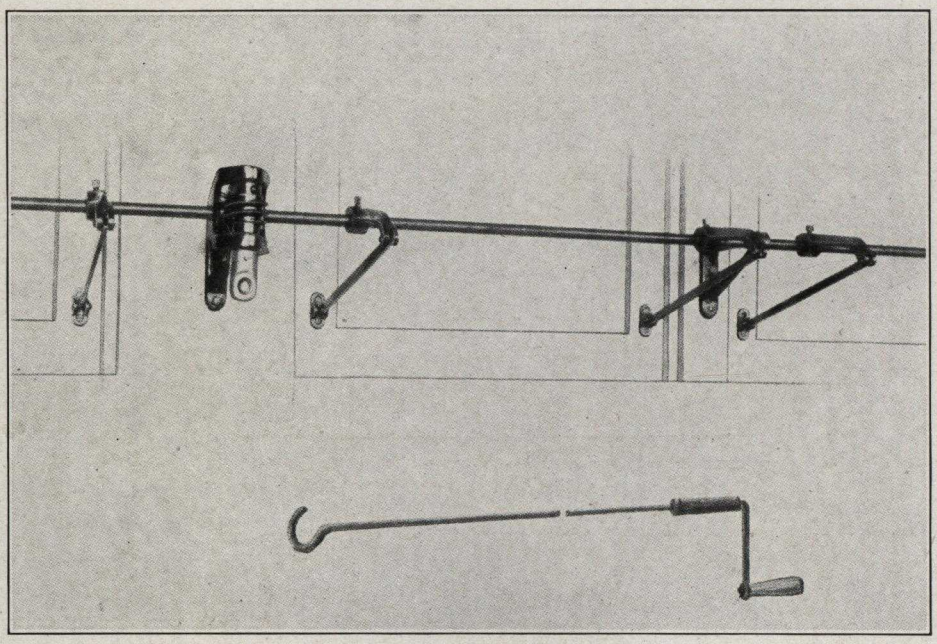
PRICES

	LIST EACH
Operating Gear No. 195 Including 30 feet of Bright Chain	$ 8.50
Operating Gear No. 195 Including 30 feet Galvanized Chain	9.10
Sash connections No. 5 Including Sprocket, Shaft Bracket, Idler, Sash plates and Chain	2.50

	LIST EACH
Shafting, per foot Including necessary couplings	.22
Extra Chain, per foot, Bright	.05
Extra Chain, per foot, Galvanized	.07

All necessary bolts and screws are furnished

STYLE No. 6



This Operator is especially designed to control small sash in store fronts or over display windows. The power is transmitted by means of a Detachable Handle which is furnished in lengths to suit conditions.

This Style will control a run of 20 feet of small pivoted sash and hinged sash according to their weight and position.

This Style can be furnished in our heavier type devices, see page 7. The eye can be located any distance from the gear. This device is often used where a chain or hand wheel would be impractical, this type being used as the operating handle is detachable.

The larger sized Style No. 6 Operating Gears take the same prices as Style No. 2 Operating Gears in the corresponding sizes.

PRICES

Prices quoted on Connecting Arms include Connecting Rod and Sash Plate. Price quoted on ¾" Shafting includes necessary Couplings.

	LIST EACH
Operating Gear No 1963/4	$4.00
Connecting Arm No. 346-A (6")	.65
Connecting Arm No. 349-A (9")	.70
Shaft Bracket No. 346-B (6")	.40

	LIST EACH
¾" Shafting, per foot	.19
Operating Handle (Plain)	3.00
Operating Handle (Electro Plated)	4.00

All necessary bolts and screws are furnished

Table of Maximum Runs that can be operated by Style Nos. 1, 2, 3 and 6 using 1 5-16" shaft

CENTER SIDE PIVOTED SASH

Height of Sash	No. 360 Gear						No. 520 Gear						No. 1500 Gear					
	No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"				100'	20"	115°												
2'-6"	75'	26"	120°	98'	18"	75°												
3'-0"	73'	30"	114°	96'	16½	54°												
3'-6"	71'	28"	82°	94'	16"	45°												
4'-0"	69'	26"	65°	92'	15"	37°												
4'-6"	67'	25"	55°															
5'-0"	58'	23"	45°															
5'-6"	54'	25"	45°															
6'-0"	50'	28"	45°															

TOP HINGED SASH (VERTICAL) SWING OUT

Height of Sash	No. 360 Gear						No. 520 Gear						No. 1500 Gear					
	No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	40'	26"	65°	75'	16"	40°	55'	26"	65°	100'	21½	54°						
2'-6"	40'	24"	48°	75'	16"	30°	55'	24"	48°	100'	20½	40°						
3'-0"	40'	23½	39°	75'	15½	25°	55'	23½	39°	100'	20"	33°						
3'-6"	40'	23½	33°	75'	15"	20°	55'	23½	33°	100'	19½	27°						
4'-0"	40'	23"	28°				55'	23"	28°				55'	36"	45°			
4'-6"	40'	23"	26°				55'	23"	26°				55'	36"	39°			
5'-0"	40'	23"	22°				55'	23"	22°				55'	35½	35°			
5'-6"	40'	23"	20°				55'	23"	20°				55'	35"	31°			
6'-0"	40'	23"	16°				55'	23"	16°				55'	35"	29°			

TOP HINGED SASH (30° OFF VERTICAL) SWING OUT

Height of Sash	No. 360 Gear						No. 520 Gear						No. 1500 Gear					
	No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	38'	26"	65°	44'	16"	40°	55'	26"	65°	60'	16"	40°						
2'-6"	32'	24"	48°	37'	16"	30°	45'	24"	48°	52'	16"	30°						
3'-0"	28'	23½	39°	33'	15½	25°	38'	23½	39°	47'	15½	25°						
3'-6"	24'	23½	33°	28'	15"	20°	33'	23½	33°	40'	15"	20°						
4'-0"	20'	23"	28°				28'	23"	28°				28'	36"	45°			
4'-6"	19'	23"	25°				25'	23"	25°				25'	36"	39°			
5'-0"	18'	23"	22°				23'	23"	22°				23'	35½	35°			
5'-6"	17'	23"	20°				22'	23"	20°				22'	35"	31°			
6'-0"	16'	23"	18°				21'	23"	18°				21	35"	29°			

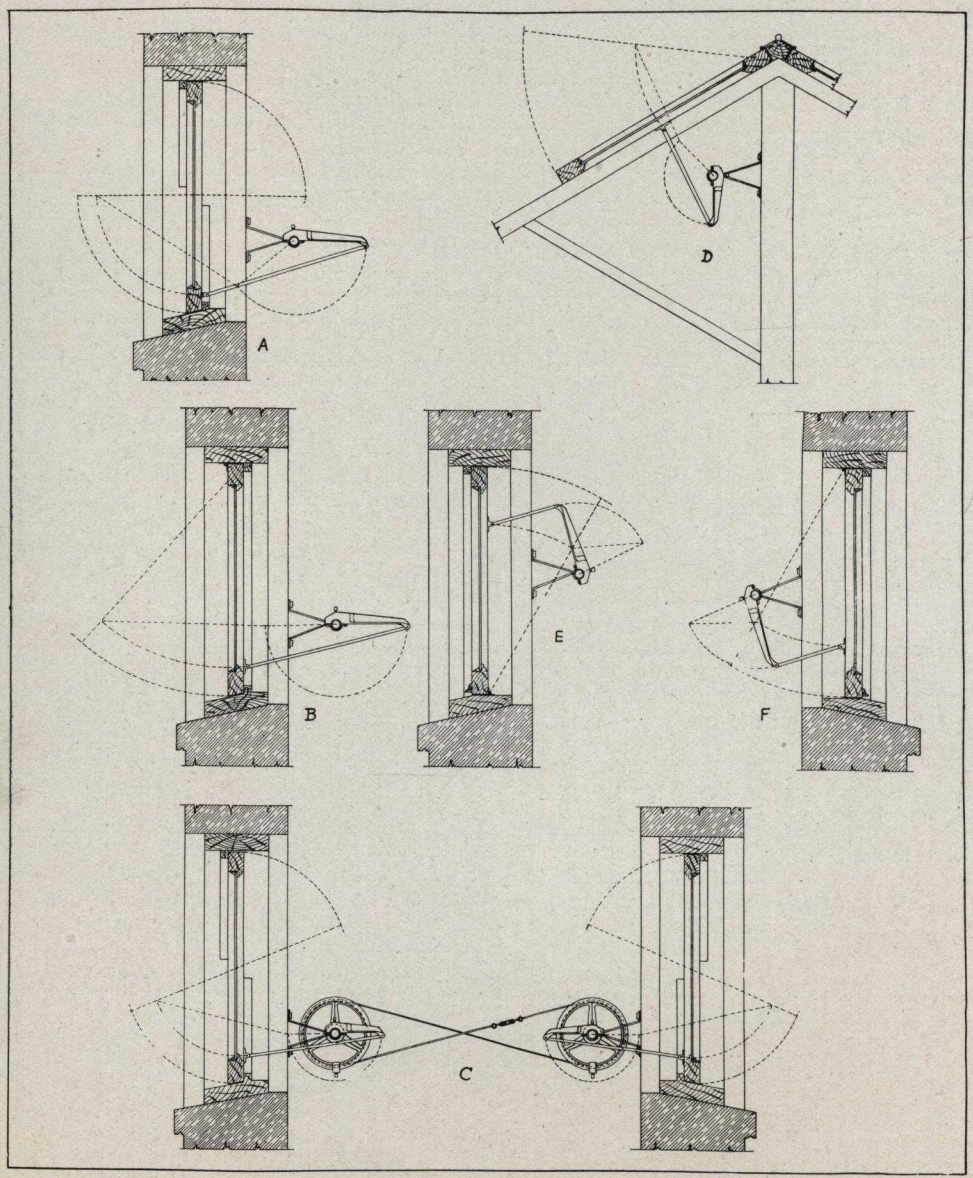
BOTTOM HINGED SASH SWING IN

Height of Sash	No. 360 Gear						No. 520 Gear						No. 1500 Gear					
	No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm			No. 90 Arm			No. 60 Arm		
	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"				35'	18"	45°				50'	18"	45°				75'	18"	45°
2'-6"				35'	18"	35°				43'	23"	45°				65'	23"	45°
3'-0"				35'	17½	29°				25'	27"	45°				50'	27"	45°
3'-6"				35'	17"	25°				43'	22"	30°				65'	22"	30°
4'-0"				25'	20"	25°				25'	25"	30°				50'	25"	30°
4'-6"				25'	20"	22°				25'	25"	27°				47'	25"	27°
5'-0"				25'	20"	20°				25'	24"	24°				43'	24"	24°
5'-6"				25'	20"	18°				25'	24"	22°				39'	24"	22°
6'-0"				25'	20°	16°				25'	24"	20°				35'	24"	20°

A Maximum length of Run B Opening in inches C Opening in degrees

This table is based on weights of wood sash 1¾" thick. Lengths of runs of other types of sash will vary slightly according to their weight.

Various Conditions of Sash-Operation Met With Either Style 1, 2, 3 or 6. Showing the Position of the Connecting Arm, Shaft Bracket and Shaft.



A Side pivoted sash swinging out at bottom.

B Top hinged sash swinging out at bottom.

C Opposite parallel runs of side pivoted sash operated by one Gear Station, by means of sheaves and cables. Two 8" sheave wheels, part No. 32, are used.

D Top hung sash, swinging up, as used in green houses, with sash operator hung on center posts.

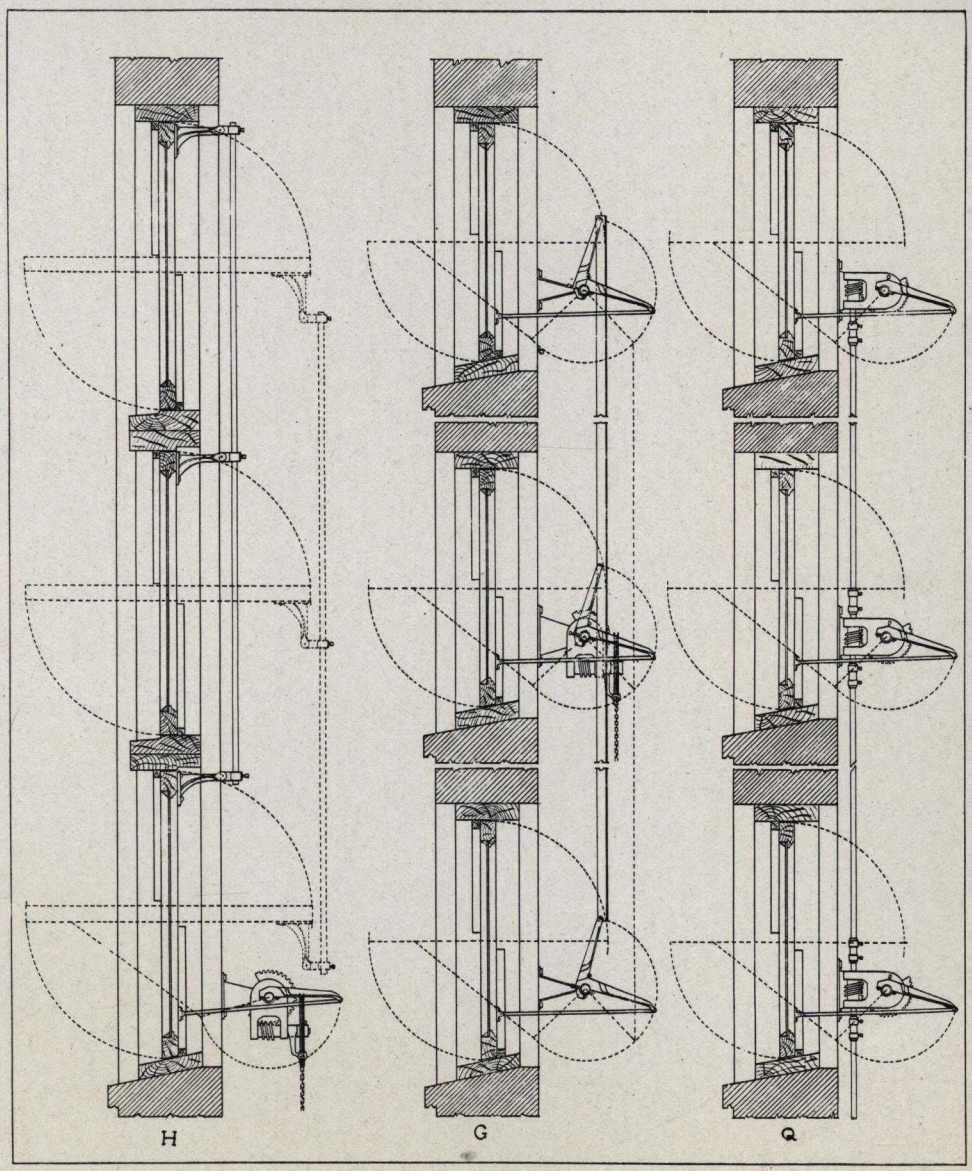
E Bottom hung sash swinging in at top.

F Top hung sash swing in at bottom.

Sheaves per set including cable and turnbuckles up to 8'-0" o.c. $7.00.

When ordering give Style Number and Condition Letter

Parallel Runs of Sash situated one above the other operated by Style Nos. 1, 2, 3 or 6



H. Style No. 1 Gear used in connection with sash brackets, part No. 12.

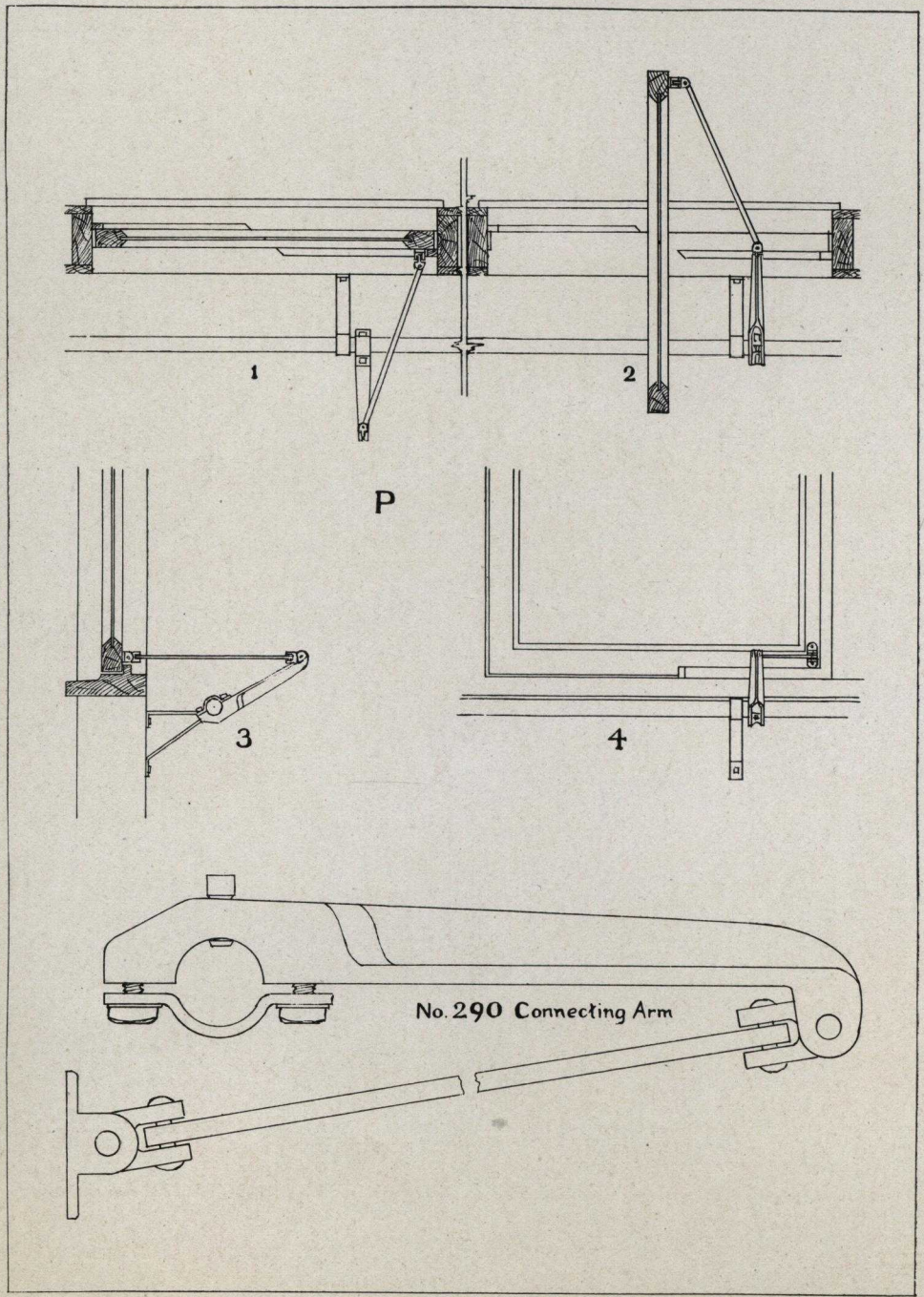
One or two sash brackets may be used on each ventilator. Style No. 2, No. 3, or No. 6 Operating Gears may be used with this layout.

G Style No. 1 Gear. used in connecting with tie arms and tie rods. Style No. 2, No. 3, or No. 6 Operating Gears may be used with this layout.

Q Style No. 3 Gears are used to operate the above condition. One Gear is used for each horizontal run. Style No. 2 or No 6 can also be used in this manner.

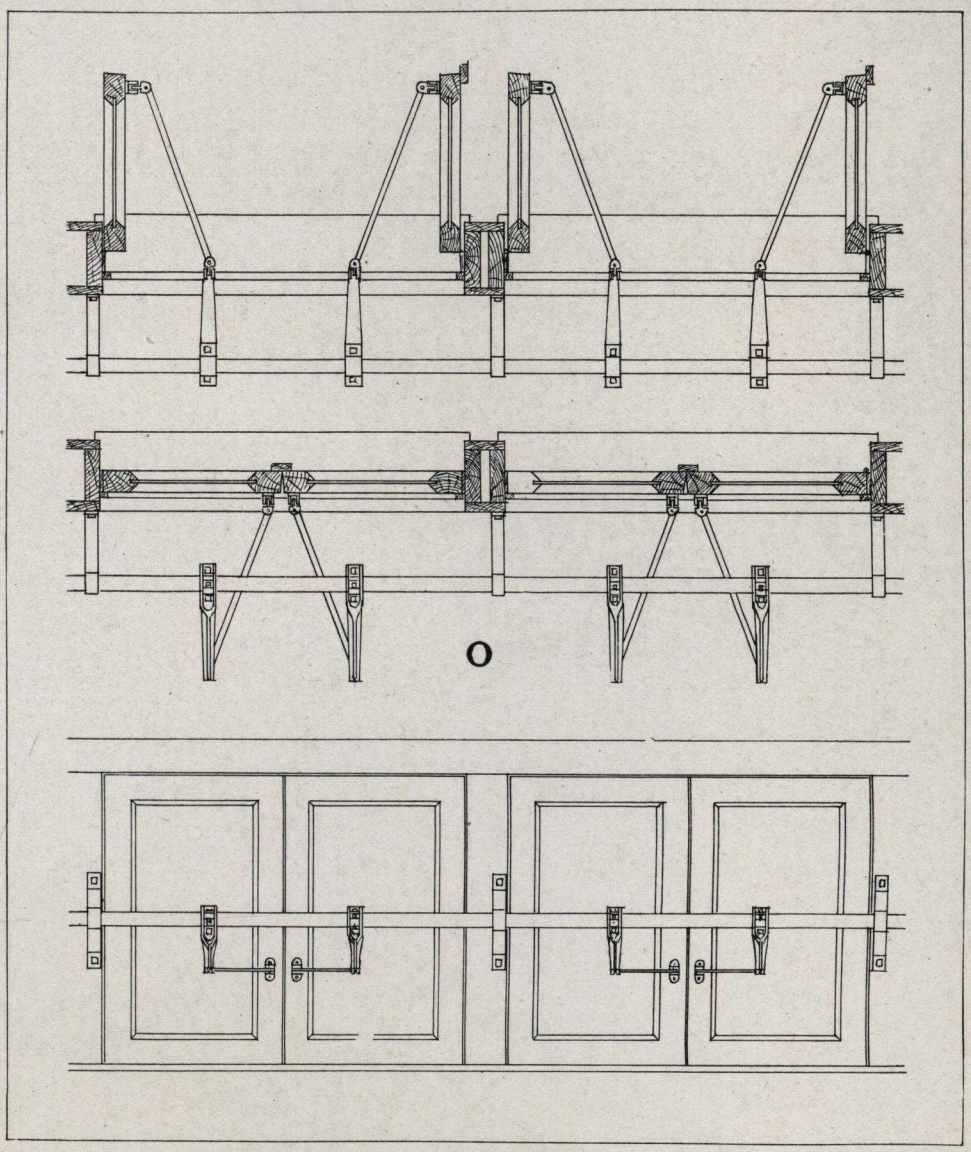
	PRICES LIST EACH
Sash Brackets, each	$0.50
5-8" Rod for connecting sash brackets, per foot	.18
Tie Arms, each	.60
T Bars for connecting tie arms, per foot	.20
1 5-16" Collars, each	.15

Connecting Arm No. 290



Arm No. 290 as applied to top and bottom pivoted sash. Cut 1 shows Sash Closed. Cut 2 shows Sash Open. When ordering give Style Number and Condition Letter.

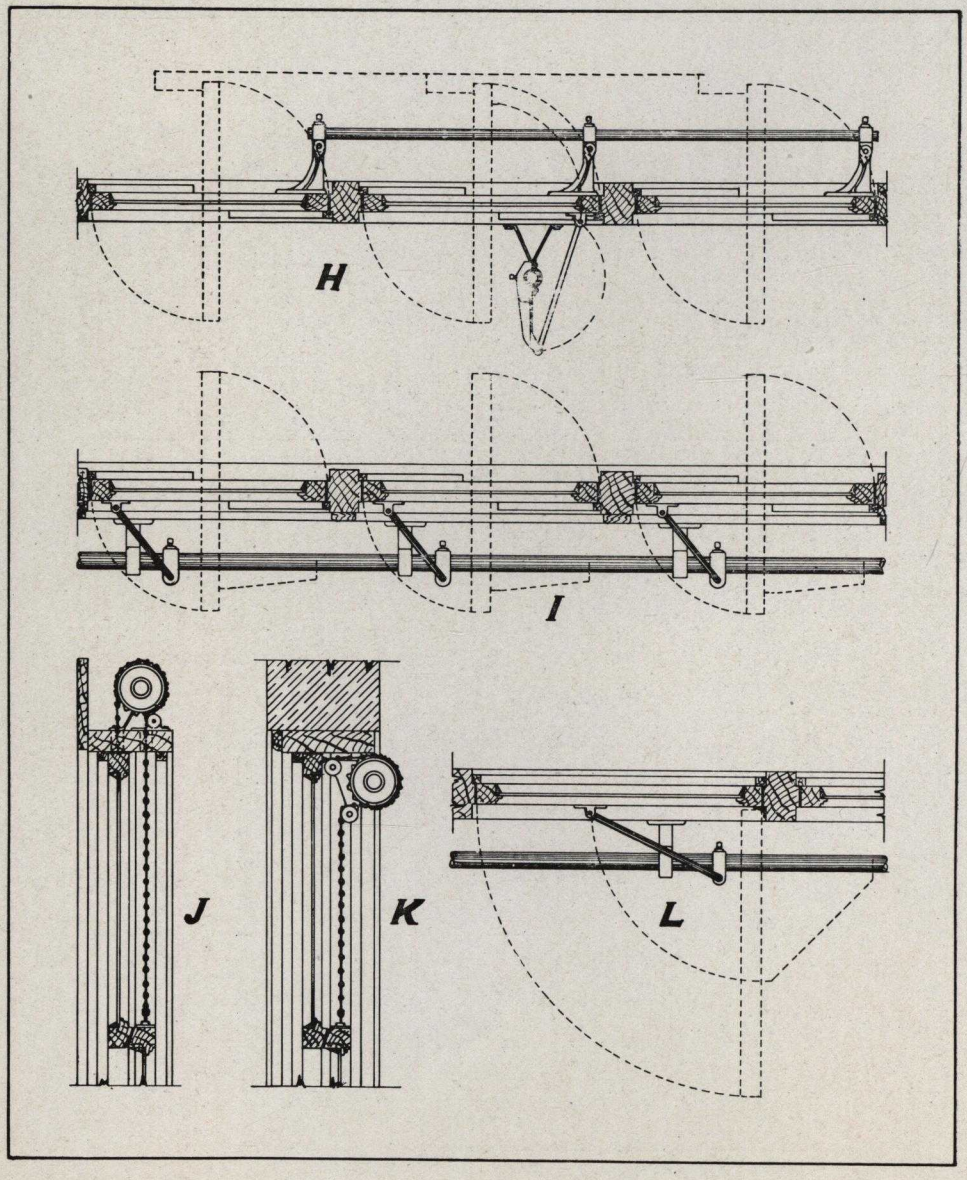
Connecting Arm No. 290



Arm No. 290 as applied to Casement Sash. For short runs only.

Price, No. 290 Connecting Arm including rod and sash plate, $1.00, other parts take prices shown under various styles. When ordering give Style Number and Condition Letter

Various conditions of Sash-Operation met with Style Nos. 1, 4 and 5



H Top and Bottom Pivoted Sash Operated with Style 1 with Special Sash Connection, Part No. 26.

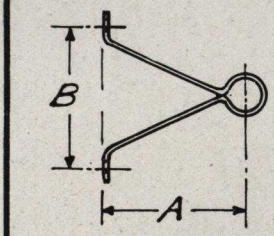
I Top and Bottom Pivoted Sash Operated with Style 4.

J & K Counterbalanced Sliding Sash Operated with Style 5.

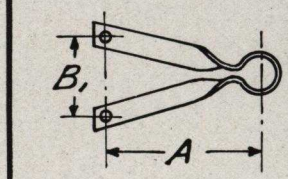
L Side Hinged Sash Operated with Style 4.

When ordering give Style Number and Condition Letter

Punching Measurements for Regular and Flat Wrought Shaft Brackets



REGULAR SHAFT BRACKET



FLAT SHAFT BRACKET

SIZE A	REG. B	FLAT B,	SIZE A	REG. B	FLAT B,
3"	3 1/8"	1 5/8"	14"	11 3/4"	10"
4"	3 7/8"	2 3/8"	15"	12 1/2"	10 3/4"
4 1/2"	4 1/4"	2 7/8"	16"	13 1/4"	11 5/8"
5"	4 3/4"	3 1/8"	17"	14 1/8"	12 3/8"
6"	5 1/2"	4"	18"	14 7/8"	13 1/8"
7"	6 1/4"	4 3/4"	19"	15 3/4"	13 7/8"
8"	7 1/8"	5 1/2"	20"	16 1/2"	14 5/8"
9"	8"	6 1/4"	21"	17 1/4"	15 3/8"
10"	8 3/4"	7"	22"	18"	16 1/8"
11"	9 1/2"	7 3/4"	23"	18 7/8"	16 7/8"
12"	10 1/4"	8 1/2"	24"	19 1/2"	17 5/8"
13"	11"	9 1/4"	25"	20 1/4"	18 3/8"

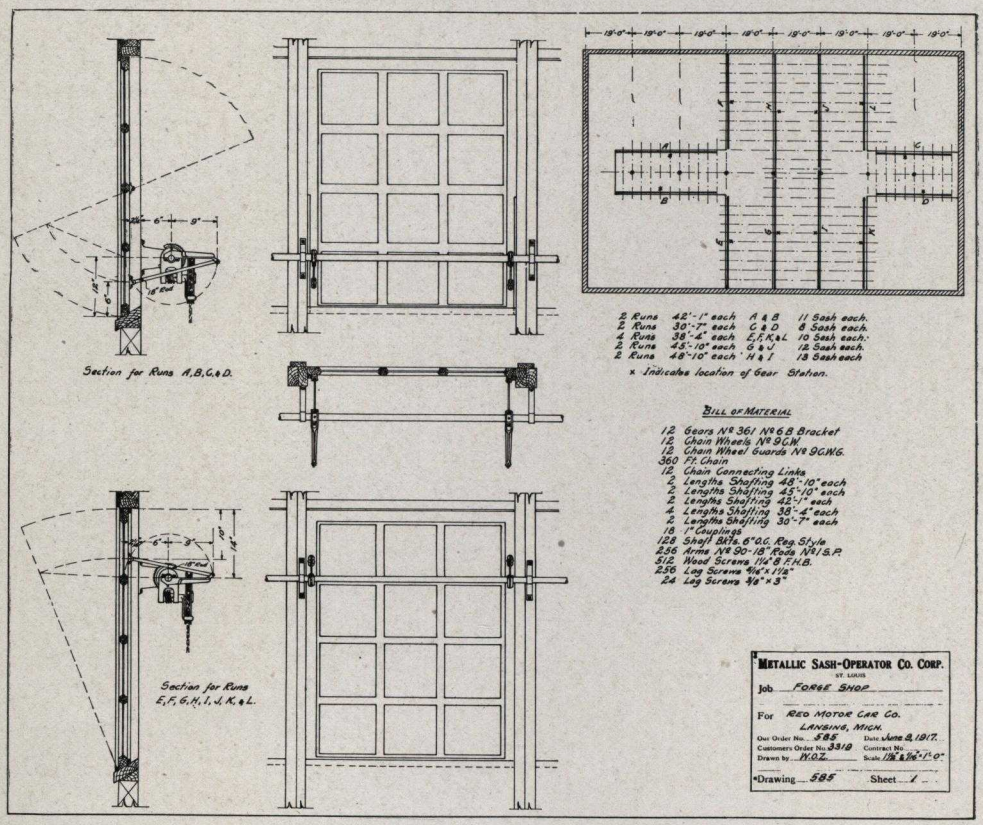
Instructions for Installing

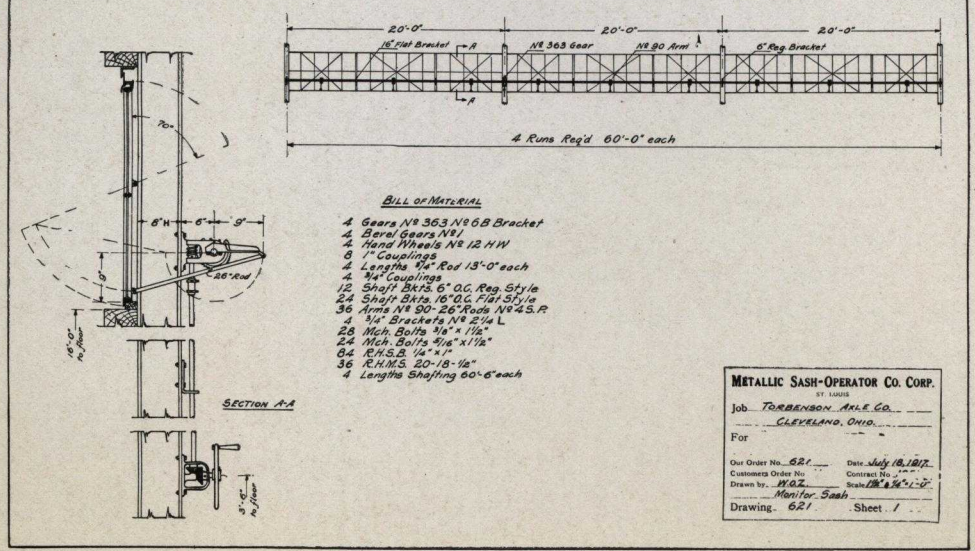
Check material against packing list or bill of material on erection drawing. An erection drawing is packed with each job. Do not attempt to erect the sash operators without proper drawings. If you are unable to locate them write direct to the factory and copies will be furnished.

See that each ventilator swings freely before attaching the sash operator as after the sash operator is installed this cannot be done. Place all parts exactly as indicated on the drawings and be sure that the shaft brackets and gear station are lined up so as to allow free movement of the shaft. Fasten the operating gear firmly to the shaft, next attach connecting arms, then pull the ventilators to their closed position and clamp the connecting arms to the shaft.

All operating gears are equipped with stops which prevent damaging the sash operator or the sash due to operating beyond the proper point. See that these stops engage at the right time. Lubricate all bearings.

Typical Erection Drawings Style No. 1 and Style No. 3





Sash-Operator Parts For Style Nos. 1, 2, 3 and 6

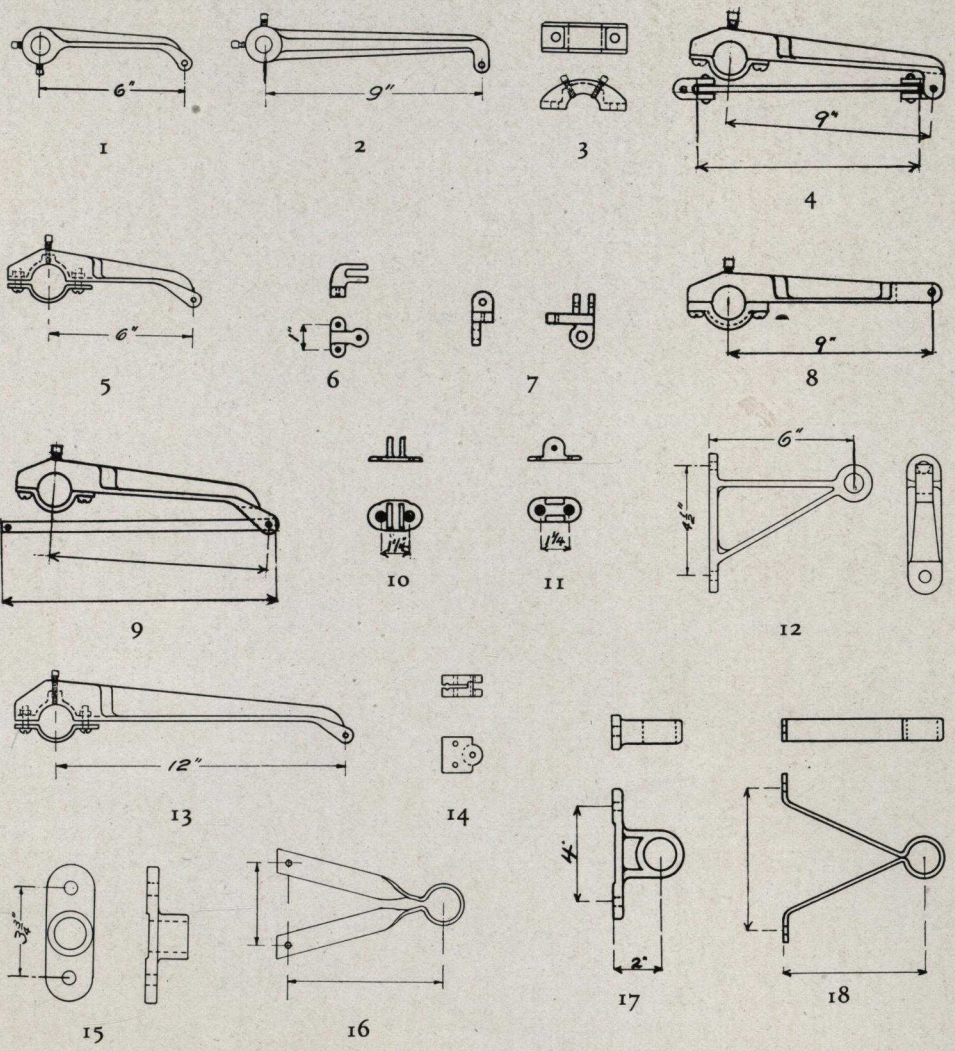


Fig. No.	Part No.	Description
1	130	No. 346 Connecting Arm 6" long
2	131	No. 349 Connecting Arm 9" long
3	199	Extra Heavy Arm Clip
4		No. 290 Connecting Arm
	134	Arm Only
	160	Swivel Only
5	132	No. 60 Connecting Arm 6" long
6	152	No. 3 Sash Plate
7	159	No. 4 Sash Plate
8	135	Tie Arm 9" long
9	133	No. 90 Connecting Arm 9" long

Fig. No.	Part No.	Description
10	150	No. 1 Sash Plate
11	151	No. 2 Sash Plate
12	7	¾" Shaft Bracket 6" o. c.
13	136	No. 120 Connecting Arm 12" long
14	163	No. 6 Sash Plate
15	15	End Shaft Bracket
16	301	Flat Shaft Bracket—any length
17	17	Regular Shaft Bracket 2" o. c.
18	300	Regular Shaft Bracket—any length

Sash-Operator Parts For Styles No. 1, 2, 3 or 6

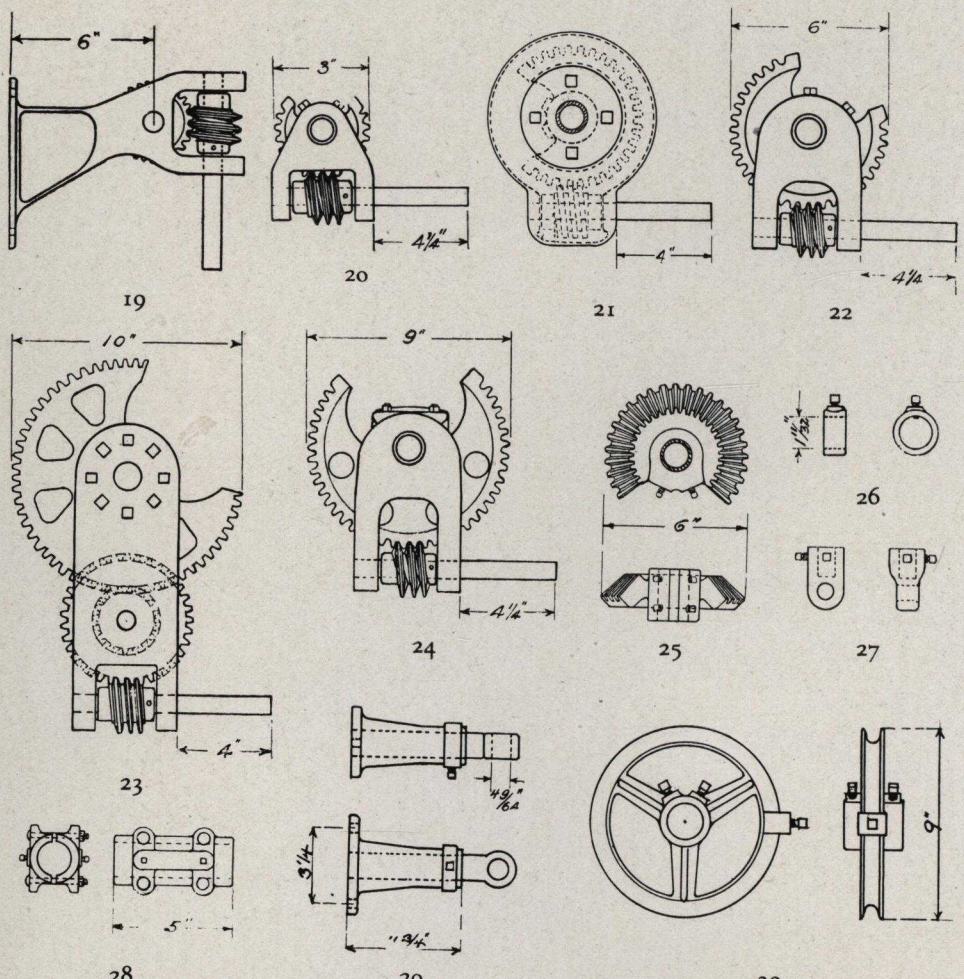
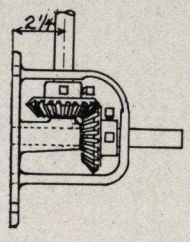


Fig. No.	Part No.	Description
19		No. 6 Operating Gear for ¾" Shaft
	54	Frame
	105	Gear
	102	Worm
	305	¾" Round Stem 8¼" long
20		No. 119 Operating Gear
	50	Yoke
	103	Gear
	102	Worm
	305	¾" Round Stem 8¼" long
21		No. 136 Enclosed Operating Gear
	250	Housing
	251	Housing Cover
	106	Gear
	102	Worm
	305	¾" Round Stem 8¼" long
22		No. 136 Operating Gear
	51	Yoke
	106	Gear
	102	Worm
	305	¾" Round Stem 8¼" long
23		No. 1500 Operating Gear
	53	Yoke
	108	Spur Gear
	113	Intermediate Gear
	102	Worm
	111	Gear Cap
	306	¾" Round Stem 8½" long
24		No. 152 Operating Gear
	52	Yoke
	107	Gear
	111	Gear Cap
	102	Worm
	306	¾" Round Stem 8½" long
25		1 5-16" Shaft Bevel Gears (Pair)
	78	Bevel Gear (one only)
26	190	1 5-16" Shaft Collar
27	192	No. 6 Eye
28	170	1 5-16" Shaft Coupling
29		Hand Wheel Bracket
	2	Base Only
	1	Bearing and Extension Rod
		5" long
		8" long
30	32	8" Sheave Wheel

Sash-Operator Parts For Style Nos. 1, 2, 3 or 6



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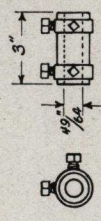

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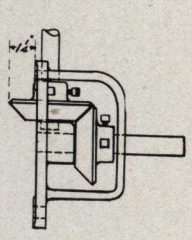

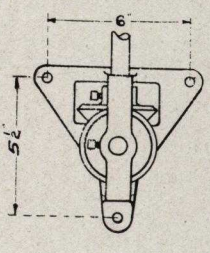

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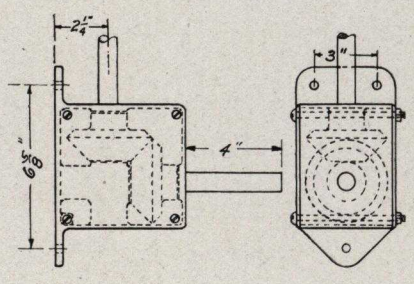

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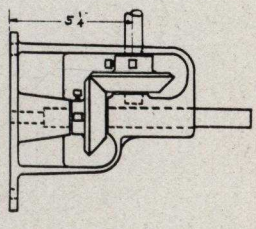

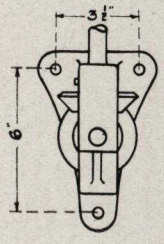

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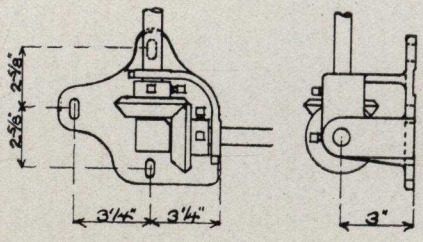

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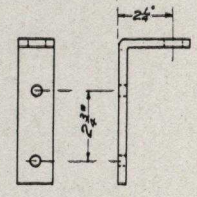

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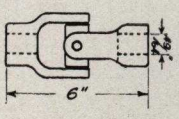

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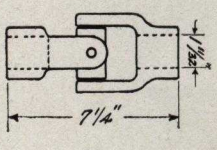
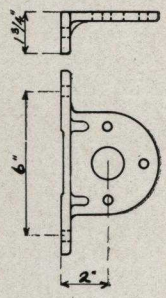


39

Fig. No.	Part No.	Description
31		No. 1 Bevel Gear
	74	Frame
	70	Bevel Gears (2)
	302	¾" Round Stem 5" long
32	171	¾" Rod Coupling
33		No. 3 Bevel Gear
	76	Frame
	70	Bevel Gears (2)
	302	¾" Round Stem 5" long
34		No. 2 Bevel Gear Enclosed
	253	Frame
	254	Cover (2)
	70	Bevel Gears (2)
	303	¾" Round Stem 6" long
35		No. 4 Bevel Gear
	77	Frame
	70	Bevel Gears (2)
	304	¾" Round Stem 8" long
36		No. 2 Bevel Gear
	75	Frame
	70	Bevel Gears (2)
	302	¾" Round Stem 5 long
37	310	¾" Rod Bracket 2¼" o. c.
38	90	¾" Universal Joint
39	92	1 5-16" Universal Joint

Sash-Operator Parts For Style Nos. 1, 2, 3 and 6



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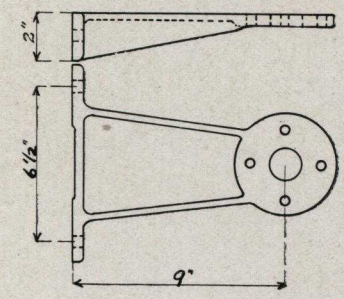

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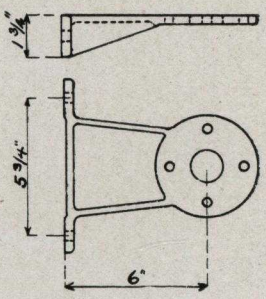

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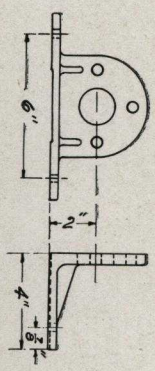

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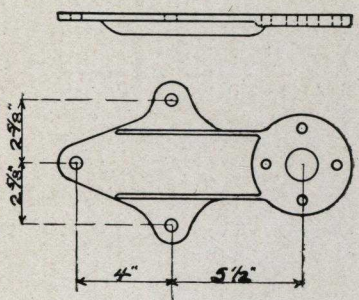

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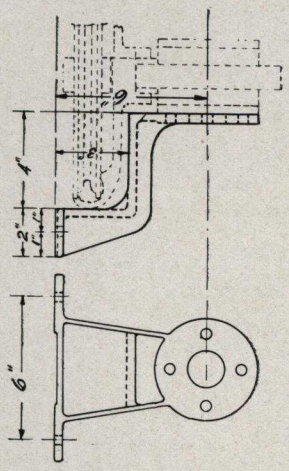

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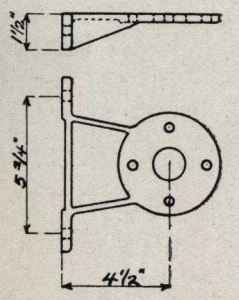

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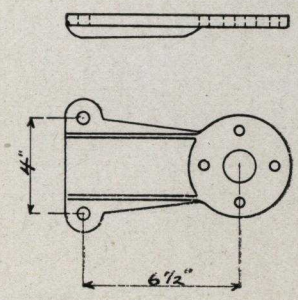

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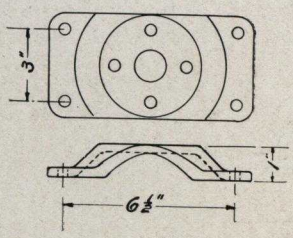
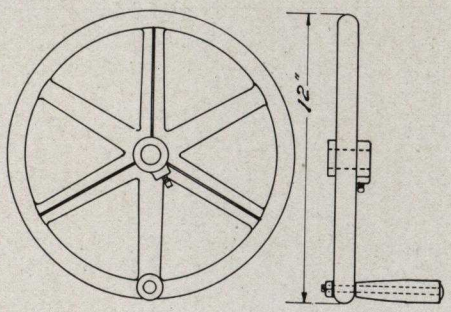


48

Fig. No.	Part No.	Description	Fig. No.	Part No.	Description
40	16	Regular Gear Bracket 2" o. c.	45	19	Special Gear Bracket 6" o. c.
41	6	Regular Gear Bracket 9" o. c.	46	3	Regular Gear Bracket 4½" o.c.
42	4	Regular Gear Bracket 6" o. c.	47	5	Flat Gear Bracket 6½" o. c.
43	18	Special Gear Bracket 2" o. c.	48	10	End Gear Bracket
44	11	Flush Gear Bracket			

Sash-Operator Parts For Style Nos. 1, 2, 3 and 6



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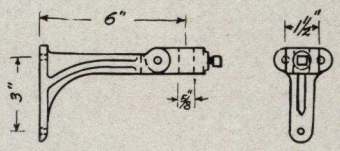

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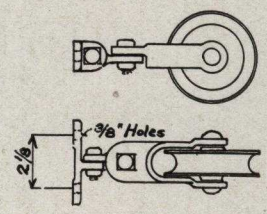

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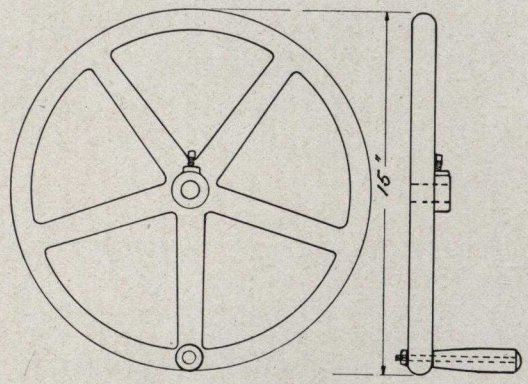

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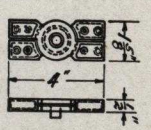

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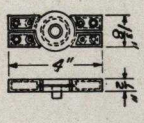

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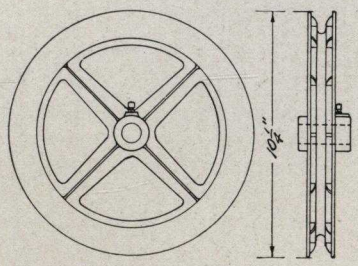

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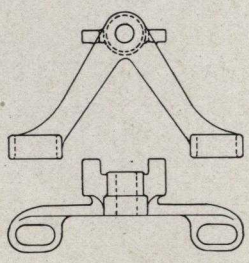

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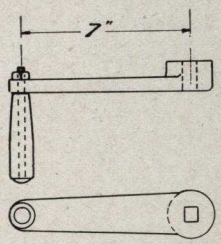
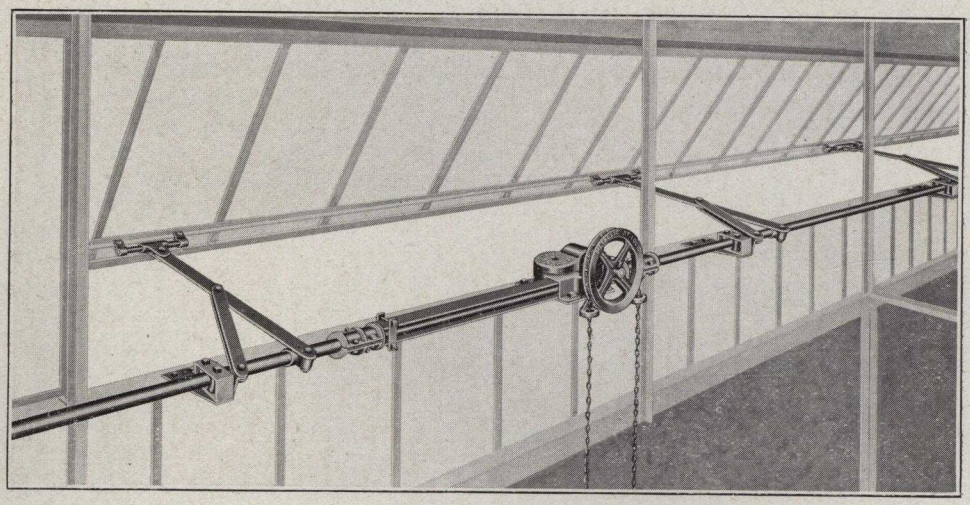


55

Fig. No.	Part No.	Description
49		12" Hand Wheel
	33	Wheel Only
	198	Handle, including bolt
50	12	Sash Bracket
51		No. 197 Idler
	196	Pulley
	197-A	Pulley Frame
	197-B	Link
	197-C	Base
52		15" Hand Wheel
	40	Wheel Only
	198	Handle, including bolt
53	30	9" Chain Wheel
54	36	9" Chain Wheel Guard
55		Detachable Handle
	225	Lever Only
	198	Handle, including bolt
56	1000	Sash Center
57	1001	Sash Center

STYLE No. 9



Patented July 18, 1916—October 9, 1917

Tension Sash-Operator

The No. 9 Tension Sash-Operator is designed to operate long runs of heavy sash, but it can be used on any run of sash where a positive action is required. The operating gears are made in two sizes, and the connecting arms are made in four lengths.

The power is developed by a worm and worm gear directly connected to a pinion gear, which drives the rack forward and backward. The rack is made in a deep channel shape, and the shaft passes through it and is concentric with it, thereby eliminating any unnecessary strain on the shaft at this point. The shaft is held in place by U bolts and thrust bearing at either end of the rack. These gear stations are equipped with thrust ball bearings to insure ease of operation. The shaft is supported by roller brackets, which can be furnished in lengths to suit any requirements.

This device is, ordinarily, fastened to the sill angle, but it can be fastened to any part of the building which conditions may require.

The long member of the 24" connecting arm is made of 5-16" x 1 1-2" steel, and the short one is composed of two pieces of 1-4" x 1 1-2" steel. The long members of the 32", 40" and 48" connecting arms are made of 3-8" x 1 1-2" steel, and the short ones are composed of two pieces of 5-16" x 1 1-2 steel.

The connecting arms should be placed from six to eight feet apart. This device can be furnished motor driven.

PRICES

Prices of Gear Stations include 30' of bright chain. Prices of Connecting Arms include Roller Brackets and Sash Fitting. Price of Shafting includes necessary Couplings.

	LIST EACH		LIST EACH
No. 9-A Gear Station	$20.00	40" Connecting Arms	4.30
No. 9-B Gear Station	30.00	48" Connecting Arms	5.00
No. 201-A Idler Chain Wheel Guard	1.00	Shafting, per foot	.22
No. 201-B Idler Chain Wheel Guard	2.00	Chain, per foot (polished bright)	.07
24" Connecting Arms	3.80	Chain, per foot (galvanized)	.08
32" Connecting Arms	4.00		

All necessary bolts and screws are furnished

Table of Maximum Runs which can be operated by No. 9-A and No. 9-B Operating Gears using Connecting Arms of various lengths.

TOP HINGED CONTINUOUS STEEL SASH (VERTICAL)

No 9A GEAR

HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	100'	19"	45°									
2'-6"	100'	18½"	36°									
3'-0"	100'	18"	30°	65'	29½"	48°						
3'-6"				65'	28½"	40°						
4'-0"				65'	28"	35°	42'	39"	48°			
4'-6"				65'	27½"	30°	42'	38"	42°	34'	49"	54°
5'-0"							42'	37½"	37°	34'	48"	47°
5'-6"							42'	37"	33°	34'	47"	42°
6'-0"							42'	37"	30°	34'	46"	37°

No 9B GEAR

HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	91'	28"	36°	59'	39"	48°						
2'-6"	91'	27½"	30°	59'	38"	42°	48'	49"	54°			
3'-0"				59'	37½"	37°	48'	48"	47°			
3'-6"				59'	37"	33°	48'	47"	42°			
4'-0"				59'	37"	30°	48'	46"	37°			

TOP HINGED CONTINUOUS STEEL SASH (30° OFF VERTICAL)

No 9A GEAR

HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	45'	19"	45°									
2'-6"	45'	18½"	36°									
3'-0"	45'	18"	30°	24'	29½"	48°						
3'-6"				24'	28½"	40°						
4'-0"				24'	28"	35°	18'	39"	48°			
4'-6"				24'	27½"	30°	18'	38"	42°	14'	49"	54°
5'-0"							18'	37½"	37°	14'	48"	47°
5'-6"							18'	37"	33°	14'	47"	42°
6'-0"							18'	37"	30°	14'	46"	37°

No 9B GEAR

HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	72'	19"	45°									
2'-6"	72'	18½"	36°									
3'-0"	72'	18"	30°	39'	29½"	48°						
3'-6"				39'	28½"	40°						
4'-0"				39'	28"	35°	30'	39"	48°			
4'-6"				39'	27½"	30°	30'	38"	42°	24'	49"	54°
5'-0"							30'	37½"	37°	24'	48"	47°
5'-6"							30'	37"	33°	24'	47"	42°
6'-0"							30'	37"	30°	24'	46"	37°

CENTER PIVOTED CONTINUOUS STEEL SASH

No 9A GEAR

HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	140'	17"	90°									
2'-6"	140'	21"	87°									
3'-0"	140'	19"	65°	90'	26"	90°						
3'-6"	140'	18"	52°	90'	28"	85°						
4'-0"	140'	18"	44°	90'	27½"	71°	59'	34"	90°			
4'-6"				90'	26½"	60°	59'	36"	84°			
5'-0"				90'	26½"	53°	59'	35½"	73°	48'	45"	90°
5'-6"				90'	26"	47°	59'	35"	65°	48'	44½"	86°
6'-0"				90'	26"	42°	59'	35"	58°	48'	44"	76°

No 9B GEAR

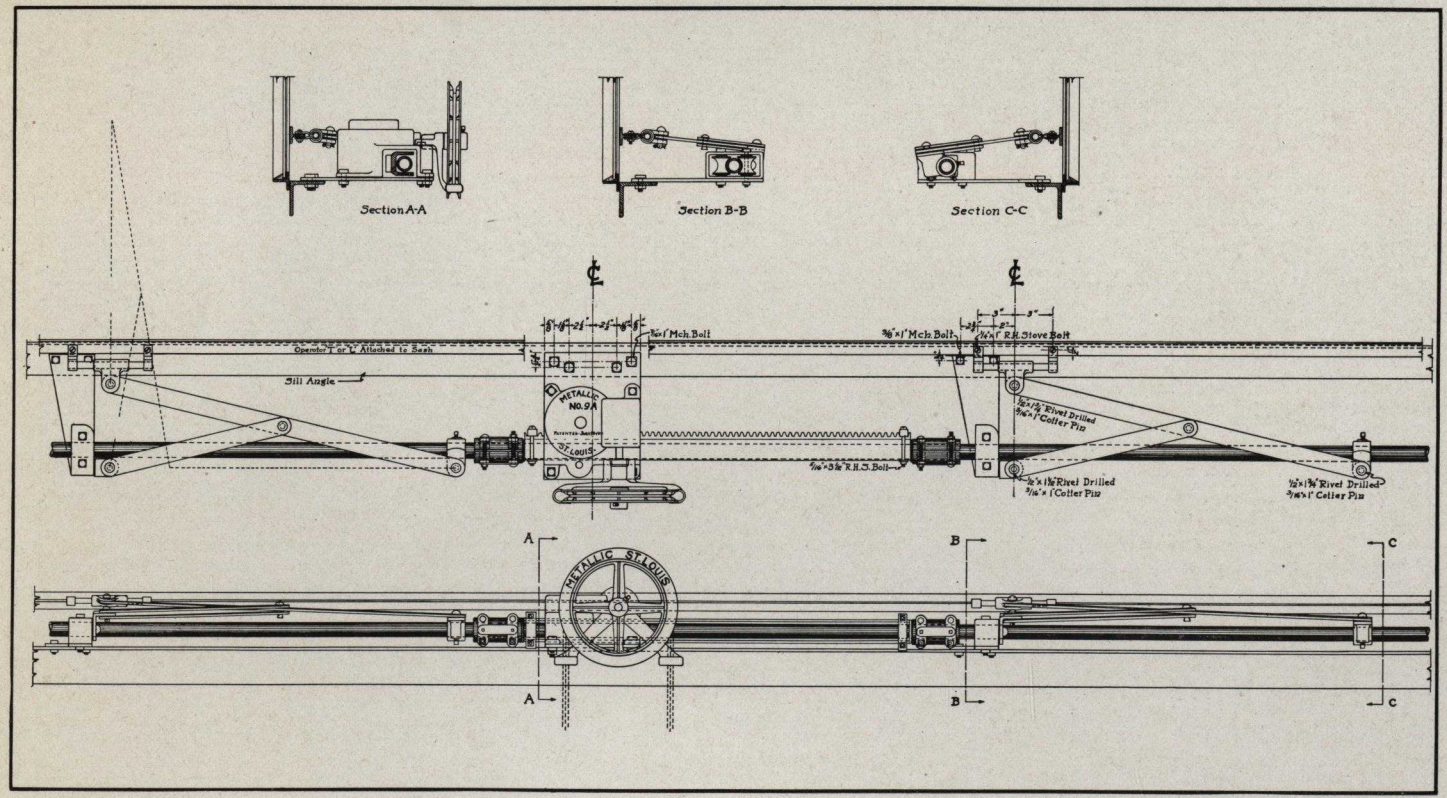
HEIGHT OF SASH	24" ARM			32" ARM			40" ARM			48" ARM		
	A	B	C	A	B	C	A	B	C	A	B	C
2'-0"	150'	17"	90°									
2'-6"	150'	21"	87°									
3'-0"	150'	19"	65°	120'	26"	90°						
3'-6"	150'	18"	52°	120'	28"	85°						
4'-0"	150'	18"	44°	120'	27½"	71°	90'	34"	90°			
4'-6"				120'	26½"	60°	90'	36"	84°			
5'-0"				120'	26½"	53°	90'	35½"	73°	80'	45"	90°
5'-6"				120'	26"	47°	90'	35"	65°	80'	44½"	86°
6'-0"				120'	26"	42°	90'	35"	58°	80'	44"	76°

A Maximum length of Run

B Opening in inches

C Opening in degrees

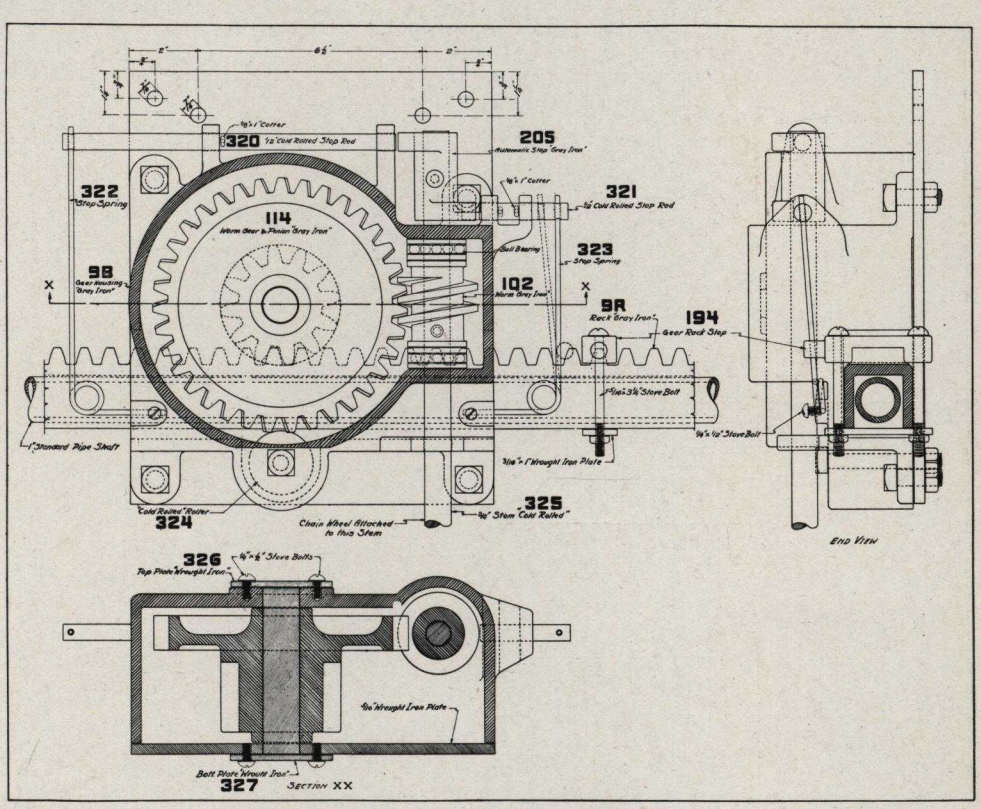
Drawing Showing Ideal Application of No. 9 Sash-Operator



Patented July 18, 1916—Oct. 9, 1917

Drawing shows the No. 9 Sash-Operator attached to sill angle. This device can be attached in various ways but the above illustrated arrangement is preferable. If the Sash-Operator is attached to the sill angle as shown above, the operator T or L should be located about 4" from the sill. The sill angle should be at least 3" x 3" supported every ten feet.

No. 9-B Operating Gear Showing Parts and Part Numbers



The Automatic Stop

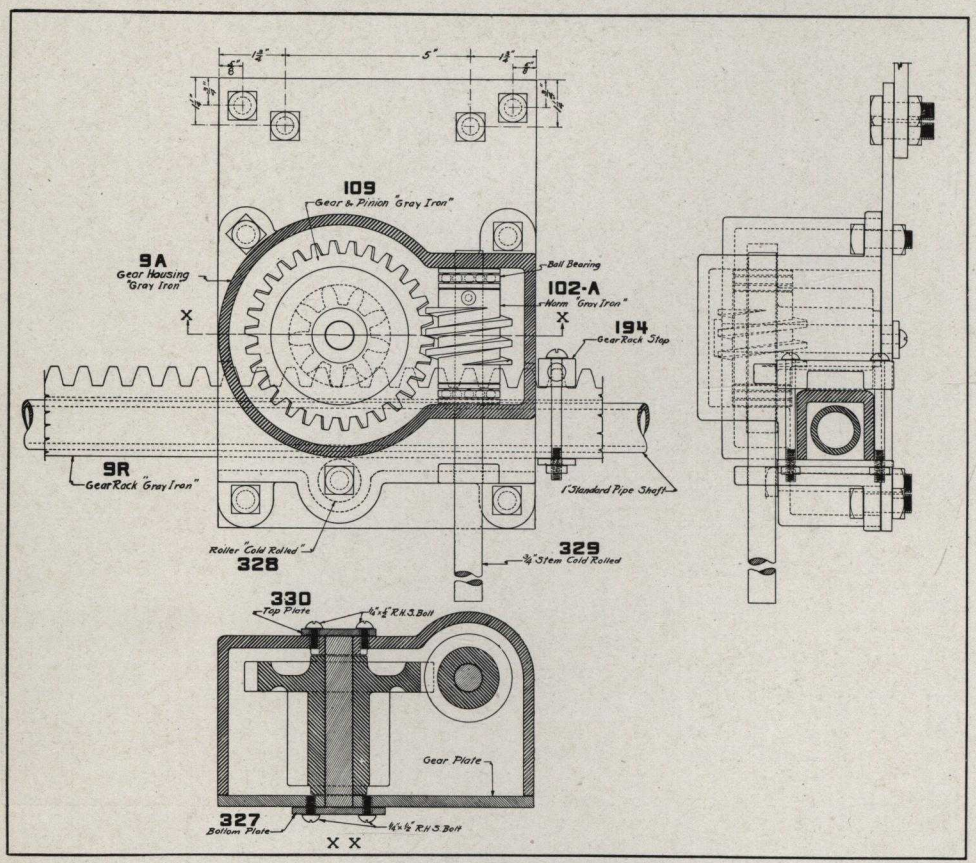
As the leverage developed in No. 9-B Gear Station is unusually great, we have found it necessary to provide an Automatic Stop, as the sash or Operator would suffer considerable damage when carlessly handled.

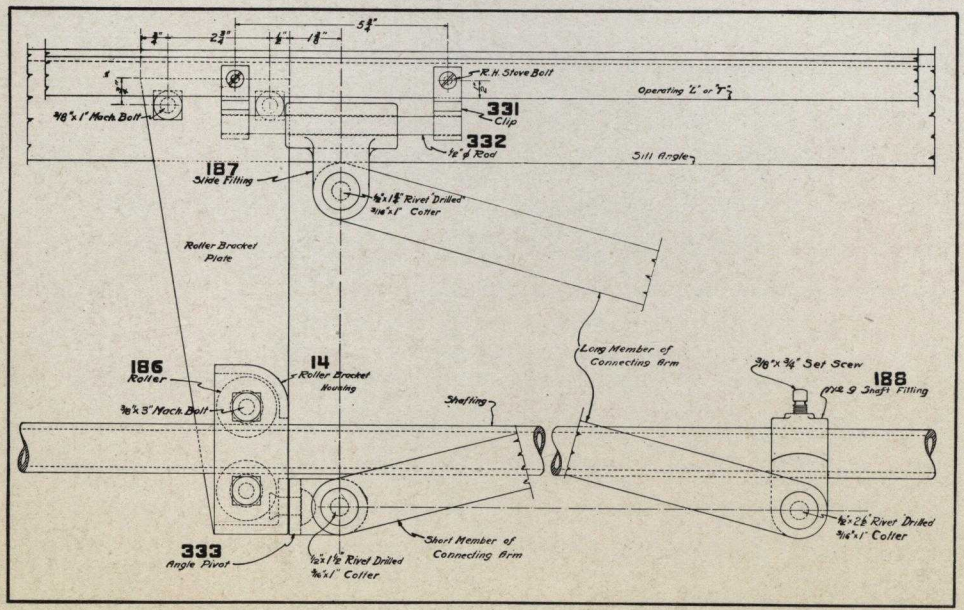
The operation of this Automatic Stop is shown in the illustration above.

The Gear Station is operated by the worm on the stem 325. A cam, part 205, is attached directly on the stem, and prevents further rotation when the pin 321, or 320 engages it.

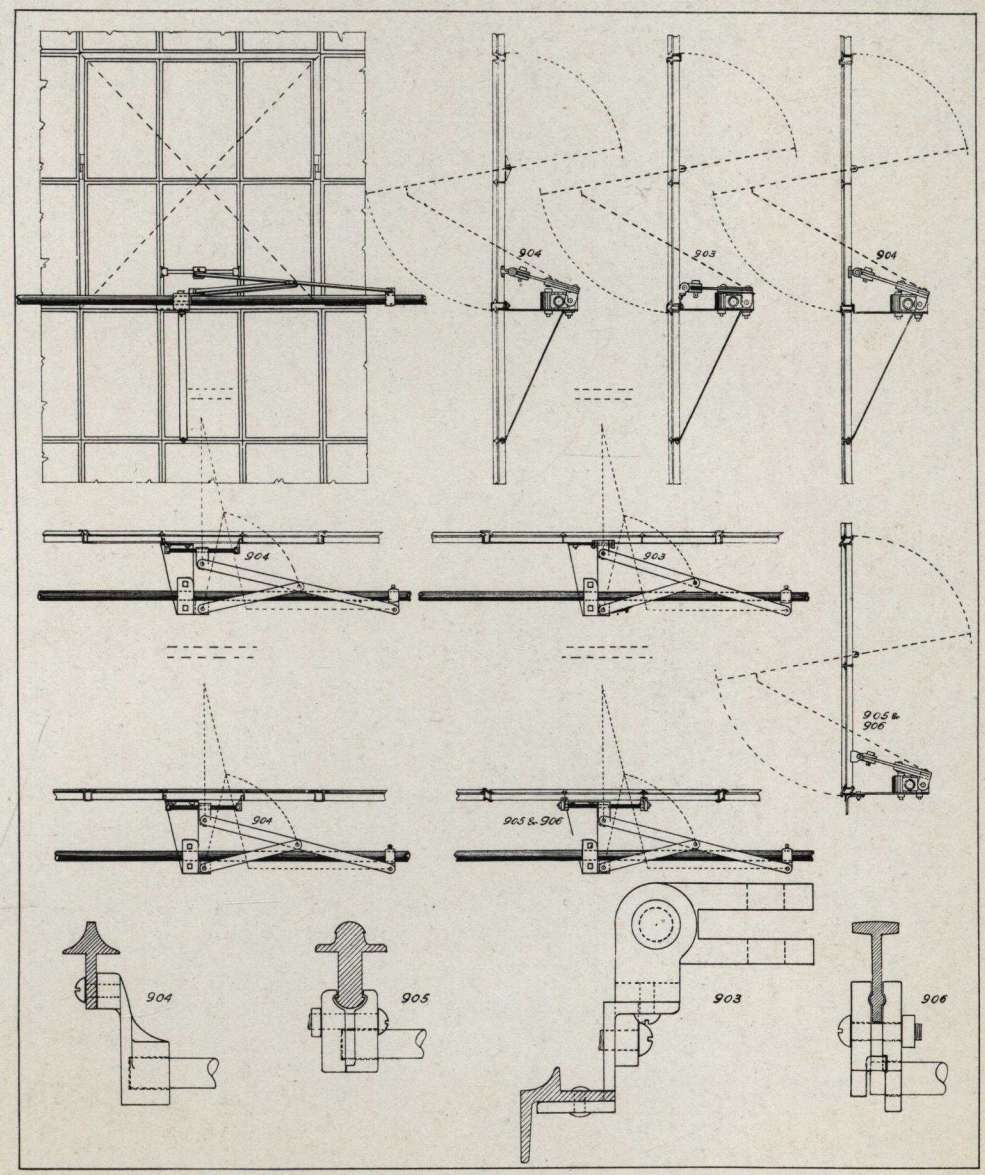
At the extreme open and closed positions, we attach a Gear Rack Stop, part 194. When movement reaches either limit, the proper Gear Rack Stop forces in the spring 323, or 322, thereby bringing into engagement either the pin 321 or 320. In this way, the powerful leverage of the worm, worm gear, and rack, is entirely done away with and no damage can result either to sash or Operator.

No. 9-A Operating Gear and No. 9 Connecting Arm and Roller Bracket Showing Working Parts and Part Numbers



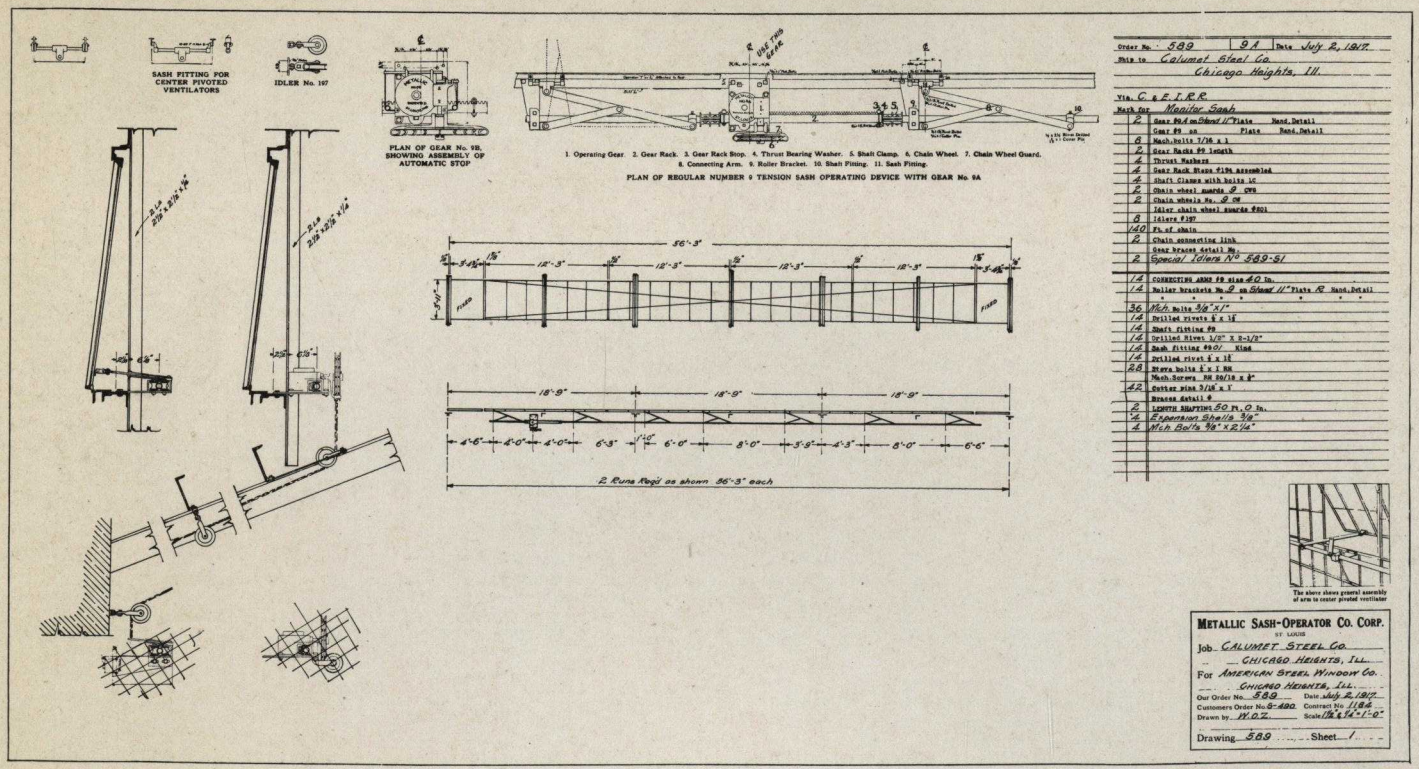


The No. 9 Connecting Arm applied to Center Side Pivoted Ventilators



The No. 9 Connecting Arm can be applied to almost any center pivoted ventilator. Special connections are made to fasten to any make of steel sash. These arms are to be used in connection with the No. 9-A or No. 9-B Gear Stations shown on page 24 and the prices for these arms are the same as listed on that page.

Erection Drawing No. 9-A Sash Operator



The above is a typical erection drawing for a No. 9 Tension Sash Operator. Proper erection drawings are furnished for each job so that the erector may know exactly how the material is to be installed.

Our erection drawings are complete in every way and assist materially in installing the material in the proper manner. We will be pleased to furnish proposed layouts and erection drawings for any job.

INFORMATION SHEET

If plans are furnished, be sure that they contain the required information.

Number of Runs_____ Length of Runs_____ No. Vents Each Run_____

Operated By_____ Operating Gears No._____ Sill to Floor_____

Quantity Style Distance

Number of Runs_____ Length of Runs_____ No. Vents Each Run_____

Operated by_____ Operating Gears No._____ Sill to Floor_____

Quantity Style Distance

Number of Runs_____ Length of Runs_____ No. Vents Each Run_____

Operated by_____ Operating Gears No. _____ Sill to Floor_____

Quantity Style Distance

Number of Connecting Arms to Each Ventilator_____

VENTILATORS

Height_____ Width_____ How Hung?_____

How Do They Swing?_____ Position of Ventilator When Closed_____

Vertical or Otherwise

Give Distance from Inside Face of Wall to Sash_____

Give Distance from Inside Face of Frame to Sash_____

Give Distance from Inside Face of Mullion to Sash _____

Answer Questions Under Only One of the Three Following Headings.

1. WOOD SASH.
   - Give Thickness_____
2. STEEL SASH.
   - Give Make _____
   - Give Mullion Used _____
   - Furnish Sash Details _____
3. SHEET METAL SASH.
   - Give Thickness of Ventilators_____
   - Are Ventilators Hollow or Wood Cored _____
   - Give Detail of Mullion
   - Give Detail of Frame

COMPOSITION OF WALL

State whether Wood, Brick, Concrete, Tile, or Steel, Etc. _____

If Tile, Give Thickness_____

If Steel, Give Structural Details and Show Position of Sash in Relation to Steel Work.

OBSTRUCTIONS

Crane Clearance, Pilasters, Braces, Columns, Other Obstructions. Give Vertical, or Horizontal Section Through Sash Showing the Above Obstructions. Give Measurements.

If Chain is to be Idled, or Rod to be Used, Give Details Showing Size, Construction and Location of Columns, Roof, or Walls, to Which Idlers for Chain or Brackets for Rod, May be Attached.

REMARKS

INFORMATION SHEET

If plans are furnished, be sure that they contain the required information.

Number of Runs_____ Length of Runs_____ No. Vents Each Run_____
Operated By_____ Operating Gears No._____ Sill to Floor_____
Quantity Style Distance

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Operated by_____ Operating Gears No. _____ Sill to Floor_____
Quantity Style Distance

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How Do They Swing?_____ Position of Ventilator When Closed_____
Vertical or Otherwise

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   Give Thickness_____
2. STEEL SASH.
   Give Make _____
   Give Mullion Used _____
   Furnish Sash Details _____
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   Are Ventilators Hollow or Wood Cored _____
   Give Detail of Mullion
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REMARKS

INFORMATION SHEET

If plans are furnished, be sure that they contain the required information.

Number of Runs_____ Length of Runs_____ No. Vents Each Run_____

Operated By_____ Operating Gears No._____ Sill to Floor_____

Quantity Style Distance

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Operated by_____ Operating Gears No. _____ Sill to Floor_____

Quantity Style Distance

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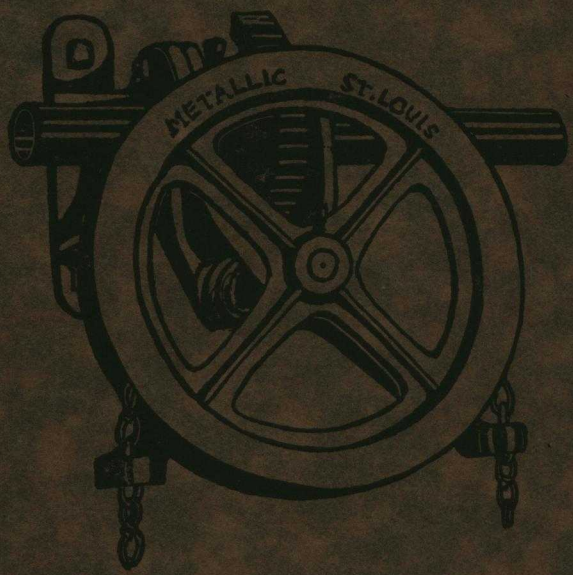
METALLIC
ST. LOUIS